

## Core Tool Class Certification Handout

Stay safe & get great results on the chop saw, bandsaw, jointer, planer, table saw, drill press and sanders.

The table saw, jointer, chop saw, planer, bandsaw, and drill press are the fundamental tools in any woodshop, helping you quickly and accurately mill wood straight and square, cut joinery, drill holes, cut curves, and countless other tasks. As important as it is to know how each tool works, it's just as critical to know how they all work together.

You can't be successful at woodworking without knowing how to cut workpieces to precise sizes and make them flat, straight, and square in the process. That's called milling, and it employs almost every machine in the shop. Learn the milling process, and you'll learn most of what you need to know about every power tool.



### Rough milling

The milling process starts with cutting all of your workpieces down to rough width, length and thickness—a little over the final dimensions you want. This makes them easier and safer to handle, and helps you get more yield from warped or crooked boards. The bandsaw and chop saw (miter saw) are your best friends here, since they can handle slightly warped and crooked boards safely, while the table saw can't.

You'll usually start by chopping boards to rough length, before trimming them to rough width (ripping) or thickness (resawing) on the bandsaw.

### Finish milling

Finish milling is when those rough workpieces are milled flat, straight, and square, as you bring them down to their final width, length, and thickness. And this is where the jointer, planer, and table saw come in. Each has a specific job to do, in a specific order. The reasons have everything to do with reference surfaces.

1. **The jointer straightens one face and one edge**—Although often confused, the jointer and planer do very different jobs. The jointer straightens and flattens a surface, and can make one surface square to the other. That's why it comes first. You joint one face and one edge, and those become your reference surfaces for all the other steps.
2. **The planer flattens the opposite face**—The planer can't really straighten wood: If you insert a warped piece, it will be still be slightly curved when it comes out. That's because its bed is below the board and its cutterhead is above. But if the face riding the bed is straight and flat (thanks, jointer), the face being planed will be just as straight and flat. What the planer actually excels at is making the second, opposite face parallel to the first.

3. **Table saw squares the second edge and trims the ends**—Now that you have one edge and two faces flat, straight, and square to each other, you can safely use the table saw to “rip” that second edge, bringing the board to final width, and also trim its ends perfectly square. That’s because you need flat, straight surfaces against the table and fence in order to use a table saw safely.

By the way, you can also return to the chop saw to trim the ends, but it’s not quite as accurate or clean-cutting as the table saw.

## General power-tool safety tips

- Keep fingers at least 3 in. away from any cutting blade. Use push sticks as needed.
- Protect your eyes, ears, and lungs.
- Turn on dust collection and open correct blast gate.
- Do not have loose sleeves or dangling jewelry. Don’t wear gloves.

## Chop saw basics

Easiest and quickest tool for crosscuts—square and angled—but doesn’t cut quite as cleanly as tablesaw. Great tool for chopping lumber to rough length, or when zero-tearout and absolute perfection are not required.

### Safety:

- Use caution with warped stock or boards that rock on table. Ensure they contact table & fence in blade area.
- Don’t cross your hands.
- Keep fingers **3 in. away** from the blade.
- If using a stop, control the piece trapped between stop and blade.

### Setup and technique:

- Read manual to adjust bevel and miter stops. Check for 90 degrees with an accurate square, plus a test cut or two.
- For cleaner cuts, let blade come to complete stop before moving the workpiece.
- Attach a stop to fence to cut multiple workpieces to same length.
- On miter and bevel cuts, don’t put your hand into narrow area between blade and fence. Change setup so your hand is on open side.

## Bandsaw basics

Best tool for cutting curves and resawing (tall cuts through the thickness of a board). Safest tool for ripping lumber to rough width (much safer and more forgiving than table saw, especially when boards are slightly warped or crooked).

### Safety:

- Check blade tension, guide setup, and tracking before starting machine (turn upper wheel by hand).
- Make adjustments with tool turned off.
- Close doors before starting machine.
- Keep fingers 3 in. away from the blade. Use push sticks where necessary.
- Don’t force the feed rate.
- Don’t force the turn circle. Try relief cuts or smaller blade.
- Turn off the saw to back the blade out of a cut.

### Setup:

- A 1/2-in., 3 tpi blade will work for most jobs, from curves to tall resaw cuts. Use a narrower, finer blade only for tight curves.
- To avoid blade drift, check that blade is centered on the upper wheel (using tracking knob), consider changing blade if dull, and don’t force the feed rate.

- Set upper guide as close to workpiece as possible without impeding your view.
- Measure from the blade to the fence with the saw turned off and blade stopped.

#### Technique:

- Use the rip fence when possible.
- Use push sticks on the side or top of the workpiece to observe the **3 in. rule**.
- Turn off saw to remove trapped workpieces, or pull workpiece from back side of blade.
- Resaw cuts work best with jointed (straight, flat) faces riding the fence and table.
- Add tall fence for tall resaw cuts, and expect a slower feed rate. Let the blade cut.

### Jointer basics

The jointer makes the face of a board straight, flat, and smooth. It also mills an edge straight and square to that jointed face.

#### General safety and setup:

- Check that fence is square to tables (for edge-jointing).
- Use push pads.
- Be sure guard is in place.
- Do not joint workpieces **less than 16 in. in length**.
- Do not make cuts deeper than 1/16 in. at a time. Check depth indicator.
- Use push sticks when edge-jointing stock less than 4 in. wide.
- Do not face-joint stock thinner than 5/8 in.
- Cupped or concave face goes down on table.
- Always joint from infeed side (right) to outfeed side (left).

#### Technique:

- Check grain direction. Joint grain downhill to avoid tear-out.
- Focus pressure on infeed table at first, and transfer pressure to outfeed table after first third of workpiece passes cutterhead.
- Do the same when edge-jointing, but add pressure against fence to keep edge square.
- Joint a face first. Then that face goes against the fence for edge jointing.

### Planer basics

This tool makes one face parallel to its opposite. So the first face must be straight for the second one to end up straight as well. Excels at bringing boards down to thickness, and smoothing their faces.

#### General safety and basic techniques:

- Measure board thickness and set planer accordingly.
- Don't plane anything **shorter than 16 in.**
- Don't remove more than 1/16 in. in a single pass.
- Don't plane anything thinner than 3/8 in.
- Check grain direction and plane with grain (uphill).
- Planer is self-feeding. Use slight push if necessary but keep hands 3 in. away from machine.

### Tablesaw basics

Most useful tool in the shop is also the most dangerous. Two main accidents are kickback and hand-to-blade contact, with the former often causing the latter.

Comes late in the milling process, after boards are already flat and straight (for proper control on the saw). Used most often to cut workpieces to accurate width and length, but also for cutting clean, accurate miters, bevels, grooves, dados, and other joinery of all kinds.

### **General safety and setup:**

- Be sure miter slots, rip fence, and blade are all parallel for safe use. Read manual to adjust.
- Unplug saw before changing blade (or brake on SawStop)
- Use a zero-clearance throat plate (or near zero-clearance) adjusted level to tabletop. Protect your eyes and ears.
- On SawStop, be sure green light is on, which means brake is properly installed and ready.
- Know your control surfaces: table plus rip fence or miter gauge
- Do not cut boards that are warped or cupped or in any way unstable on table or against fence.
- Set blade height so bottom of teeth just clear top of workpiece.
- Use a splitter/riving knife for everything but dado cuts. This will prevent kickback.
- Always control the trapped workpiece (between fence and blade or between a stop and the blade)
- Position your body out of path of potential kickback.
- Don't reach over spinning blade to clear offcuts or remove workpiece.
- Don't cut wet wood or let metal touch blade on SawStop. Will trigger brake, ruining a brake *and* a blade.

### **Safe, accurate rip cuts:**

- Make sure blade is at true 90 degrees.
- Observe the 3-in. rule by using a push stick for rip cuts less than 4 in. wide. Keep push stick within reach for final push past blade.
- Don't try to rip anything wider (front to back) than the edge touching the rip fence.
- Keep workpiece in contact with table and rip fence at all times, until fully past blade.
- One hand pushes, the other guides, until push stick takes over.

### **Safe, accurate crosscuts:**

- Miter gauge works better with auxiliary fence attached.
- Use a table saw sled for pieces wider than 8 or 10 in.—or when cleanest, most accurate cuts are needed (it offers the most control).
- Use a stop for cutting multiple workpieces to the same length. Do not use the rip fence as a stop for crosscuts. Attach stop to miter gauge or fence on crosscut sled and control the trapped workpiece.

### **Drill press basics**

Most folks will drill their first holes with a cordless drill, but when you want those holes to be perfectly clean, and perfectly square to your workpiece, you'll need the drill press.

It can take a wide variety of drill bits, from small to large. Add a table and fence and you get even more accuracy and repeatability. To prevent blowout on the back side of the hole, clamp a sacrificial board to the table and place your workpiece on that.

### **Safety and setup:**

- Be sure table is square to drill bit, and drill bit is tight in chuck.
- Return chuck key to its holder before starting drill press. Make sure it's not in the chuck!
- Check speed chart to be sure you aren't spinning a large bit too fast. Change belts if necessary.
- Control small workpieces by clamping to fence, table or use a separate vise.
- Hold larger workpieces firmly, keeping fingers 3 in. away from drill bit. Adjust fence to support workpiece.
- Clamp thin stock to table—it tends to catch and pin when the bit breaks through.
- Hold cylindrical workpieces in a V-block for drilling.

### **Technique:**

- Place a sacrificial board or panel under your workpiece for a clean exit hole.
- Make a dimple at your mark with a screw, nail, or center punch before drilling. It will improve accuracy.



- Don't force the feed rate when pulling down the handle.
- Slow up when you are near the back side of the workpiece.

## Benchtop Sanders

Includes stationary (not handheld) belt, disk, and spindle sanders. Fast and effective for smoothing and shaping curves and irregular surfaces, and other miscellaneous tasks.

### Safety and Set-up

- Turn on sander briefly to check belt-tracking, etc. Adjust as needed.
- Use crepe stick to clean clogged abrasives.
- Ask SA to change abrasive if it is worn.
- Protect your eyes, ears and lungs.
- Remove loose-fitting clothing, gloves, and jewelry, and tie back long hair.
- Make sure dust collection is active.
- Use light pressure.
- Hold workpiece firmly. Find an alternative way to control very small workpiece.
- Use the end stop to control long pieces on the Edge sander.
- Work on the downward side of the disk sander only.

### Technique:

- Lay out the curve clearly and cut away most of the waste on the bandsaw or other tool before moving to the sander.
- Use edge sander or disc sander for outside curves, making steady movements with light pressure.
- Use spindle sander of inside curves, using the largest possible drum for the smoothest result.

